

WHAT IS CLAIMED IS:

1. A mercury vapor discharge fluorescent lamp comprising a light-transmissive glass envelope having an inner surface, means for providing a discharge, a barrier layer coated adjacent said inner surface of said glass envelope, a phosphor layer coated adjacent the inner surface of said barrier layer, and a fill gas of mercury and an inert gas sealed inside said envelope, said barrier layer comprising barrier layer substrate particles and 0.1-10 wt.% yttria, said barrier layer having crystalline yttria particles dispersed throughout said barrier layer.

2. A lamp according to claim 1, wherein said barrier layer is an alumina barrier layer.

3. A lamp according to claim 1, said barrier layer further comprising a yttria film coated over the surfaces of said barrier layer substrate particles and said inner surface of said glass envelope.

4. A lamp according to claim 2, said alumina barrier layer comprising a mixture of alpha- and gamma-alumina particles having a mean particle size of 15-800 nm.

5. A lamp according to claim 2, said alumina barrier layer having a coating weight of 0.05-3 mg/cm<sup>2</sup>.

6. A lamp according to claim 1, said barrier layer being selected from the group consisting of silica, hafnia, zirconia, vanadia, and niobia barrier layers, and mixtures thereof.

7. A lamp according to claim 1, said lamp being a T8

lamp initially containing less than 5 mg of mercury.

8. A mercury vapor discharge lamp comprising a light-transmissive glass envelope having an inner surface, means for providing a discharge, a phosphor layer coated adjacent the inner surface of said glass envelope, and a fill gas of mercury and an inert gas sealed inside said envelope, said phosphor layer comprising phosphor particles and 0.001-10 wt.% yttria, said phosphor layer having crystalline yttria particles dispersed throughout said phosphor layer.
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9. A lamp according to claim 8, wherein said phosphor layer is a rare earth triphosphor layer.

10. A lamp according to claim 8, said phosphor layer further comprising a yttria film coated over the surfaces of said phosphor particles and said inner surface of said glass envelope.

11. A lamp according to claim 8, wherein said phosphor layer has a coating weight of 1-5 mg/cm<sup>2</sup>.

12. A lamp according to claim 8, wherein said phosphor layer is a halophosphate layer.

13. A lamp according to claim 8, said lamp being a T8 lamp initially containing less than 5 mg of mercury.

14. A method of providing a coating layer on a glass envelope of a fluorescent lamp comprising the steps of:

- (a) providing a suspension of 1-10 wt.% coating layer substrate particles in a suspension medium of deionized water;
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- (b) dissolving a yttrium salt in said suspension;
- (c) acidifying said suspension to bring the suspension to a pH of 3-6;
- (d) applying said suspension to the inner surface of the glass envelope of said fluorescent lamp;
- (e) drying said suspension on said inner surface of said glass envelope to provide an at least partially dried coating layer, said dissolved yttrium salt being at least partially recrystallized thereby; and
- (f) baking said coating layer to dry said coating layer, and to oxidize said recrystallized yttrium salt to yttria, said yttria being dispersed throughout said coating layer.

15. A method according to claim 14, step (e) further comprising providing a film of crystallized yttrium salt coated over the surfaces of said coating layer substrate particles and said inner surface of said glass envelope.

16. A method according to claim 14, wherein said coating layer is an alumina barrier layer, said coating layer substrate particles being alumina particles.

17. A method according to claim 16, wherein said alumina particles are a mixture of alpha- and gamma-alumina particles.

18. A method according to claim 14, said coating layer being a barrier layer selected from the group consisting of silica, hafnia, zirconia, vanadia, or niobia barrier layers, or a mixture thereof.

19. A method according to claim 16, wherein said yttrium salt is 0.1-10 percent by weight relative only to said alumina particles in said suspension.

20. A method according to claim 14, wherein said coating layer is a phosphor layer, said coating layer substrate particles being phosphor particles.

21. A method according to claim 20, said phosphor layer being a rare earth phosphor layer, said phosphor particles being a mixture of rare earth phosphors.

22. A method according to claim 20, said phosphor layer being a halophosphate phosphor layer, said phosphor particles being halophosphors.

23. A method according to claim 20, wherein said yttrium salt is 0.001-10 percent by weight relative only to said phosphor particles in said suspension.

24. A method according to claim 14, wherein said dissolved yttrium salt is provided in step (b) as an aqueous yttrium salt solution, said aqueous solution being prepared by dissolving yttria in an aqueous  
5 inorganic acid followed by neutralization to pH 7.

25. A method according to claim 14, said acidification of said suspension being achieved via addition of hydrochloric acid to said suspension.